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Historical Documentation of the Allegheny Woodrat (*Neotoma magister*) in Massachusetts

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Abstract - Although most summaries of the distribution of *Neotoma magister* (Allegheny Woodrat) do not include Massachusetts, there are 2 historical reports of the species' past occurrence there. Herein, we review those reports and provide details on a specimen from the Berkshire Mountains taken in 1958. No additional observations have been documented in Massachusetts over the subsequent 60 years. Recent efforts to confirm presence of woodrats at the Berkshire Mountains site and efforts in the past several decades to locate a population elsewhere in Massachusetts have been unsuccessful. We conclude that the Allegheny Woodrat historically occurred in Massachusetts, although available habitat was limited. Based on the available habitat and the documented patterns of decline in other portions of the Northeast, it is almost surely now extirpated from Massachusetts.

Neotoma magister Baird (Allegheny Woodrat) historically occurred throughout much of the eastern United States in the Allegheny Mountains north of the Tennessee River and to the west as far as southern Indiana and western Kentucky. Allegheny Woodrats occurred in appropriate rocky outcrops throughout much of Kentucky, Pennsylvania, Tennessee, West Virginia, western Maryland, northern and western Virginia, northeastern Alabama, and northwestern North Carolina, ranging as far north as Connecticut, New Jersey, and southeastern New York, with isolated populations north of the Ohio River in southern Ohio and southern Indiana (Hall 1981, Hamilton 1943, Hayes and Harrison 1992, Hayes and Richmond 1993, Schwartz and Odum 1957, Whitaker and Hamilton 1998). Unfortunately, both the geographic distribution and abundance of Allegheny Woodrats have been greatly reduced in recent years, and the species has disappeared from much of its historical range (Castleberry et al. 2006, Peles and Wright 2008). Allegheny Woodrats are now considered threatened or endangered in several states and believed to be extirpated from Connecticut, New York, and Ohio. This considerable decline in distribution and abundance has been attributed to habitat changes and negative impacts of *Baylisacaris procyonis* (Raccoon Roundworm) because of the increased prevalence of roundworms in *Procyon lotor* (L.) (Raccoon) (Hayes 1999, LoGiudice 2006). Curiously, the closely related *Neotoma floridana* (Ord) (Eastern Woodrat) is found in habitats broadly overlapping with Raccoons in the Midwest and can be quite abundant with considerable year-to-year fluctuations in populations (R.M. Timm, pers. observ.). Although most previous range descriptions of this species exclude Massachusetts from the historical distribution (see Castleberry et al. 2006, Hall 1981, Poole 1940, Whitaker and Hamilton 1998, Wright 2008), 2 historical records indicate that the Allegheny Woodrat once occurred within Massachusetts. Details of those earlier reports and a specimen record are provided here to assess the historical distribution. We also summarize the efforts in Massachusetts in the past several decades to assess the current status of the species.

The first reference to woodrats in Massachusetts is from George Gibbs, who in 1860 wrote "… the wood rat, now so rare in the Atlantic States, of which I caught a specimen many years ago in Massachusetts" (Suckley and Gibbs 1860:128). This record was noted

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by Allen (1894) and Peles and Wright (2008), but seemingly has been overlooked by most authors. We have no evidence that this specimen still exists or precisely where it was taken. However, the decline of the Allegheny Woodrat seemingly has been ongoing since at least the 1860s. In her history and current status of the Allegheny Woodrat, Wright (2008:13–14) wrote, "The lone record from Massachusetts is a specimen in the museum of the University of Kansas that was collected in Berkshire County … The existence of actual populations has never been established in either state [i.e., CT and MA]."

The University of Kansas specimen confirms the historical occurrence of *N. magister* in Massachusetts, and we are now able to provide details as to the circumstances of its capture. On a previous camping trip to the Black Rock area of the Berkshire Mountains in the spring 1958, William H. Gehrmann Jr. and Jon A. Sperling observed a single woodrat one night while camped under an overhanging rock shelter (Fig. 1; W.H. Gehrmann, Texas Christian University, Fort Worth, TX, pers. comm.). On the evening of 4 October 1958, they set snap-traps among the rocks and captured an adult male Allegheny Woodrat overnight. It was prepared as a skin and skull. The specimen tag data reads: "St. Massachusetts; Co. Berkshire; Loc. 5 mi NE Sheffield; Date 5 October 1958; Coll. W.H. Gehrmann, Jr.". This area is along the same mountain range where the species historically occurred in adjacent eastern New York. Gehrmann donated the specimen to Albert Schwartz of Miami, FL, who had taught him to prepare specimens. From the 1950s through the 1980s, Schwartz maintained what was probably the most comprehensive and best-documented personal collection of mammals in the US. The Allegheny Woodrat specimen was cataloged as number 5027 in the Schwartz collection. In 1989, Schwartz's extensive personal mammal collection was transferred to the University of Kansas Natural History Museum (see Timm and Genoways [2003] for details on the Schwartz mammal collection and its transfer from Schwartz's

Figure 1. An early 1900s photograph by Raymond L. Ditmars of the basal ledge at Black Rock where William H. Gehrmann Jr. and Jon A. Sperling observed a woodrat in the spring of 1958 and later that fall captured an adult male *Neotoma magister* (KU 147843).

home in Miami to the University of Kansas). That specimen of *N. magister* is now deposited in the Recent mammal collection at KU as number 147843. All teeth are fully erupted and moderately worn; the cranium has advanced fusion of basicranial synchondroses. External and cranial measurements for this specimen and comparative measures for adult males from throughout the previously known range of the species are provided in Table 1. The measurements of the Massachusetts specimen are consistent with those published for the species elsewhere in the range albeit some measures are smaller than the mean for other adult males. This is the only known specimen of *N. magister* from Massachusetts and the only record with a documented locality.

At the site where the woodrat was taken, a vertical wall of granite tapers down at both ends and extends for a total length of about 125 m. There is a ledge about half way up the cliff face where the spring 1958 sighting occurred (Fig. 1). Concerning the ledge, Ditmars (1932) wrote, "It extends vertically a hundred feet, and is several hundred yards long. Its face is indented with 'levels,' seamed with deep fissures …" The Massachusetts Chapter of The Nature Conservancy now owns and manages the area as a protected site; it has become considerably more overgrown.

When T.W. French visited the rock shelter in October 2016 and actively searched for sign of woodrats, no evidence of *Neotoma* was found. Although no woodrat sign was observed, years of decomposed pellets from a nesting pair of *Corvus corax* L. (Northern Raven) on the rock ledge where Gehrmann and Sperling camped, did include bones and teeth of *Blarina brevicauda* (Say) (Short-tailed Shrew), *Parascalops breweri* (Bachman) (Hairy-tailed Mole), *Eptesicus fuscus* (Palisot de Beauvois) (Big Brown Bat), *Tamiasciurus hudsonicus* (Erxleben) (American Red Squirrel), *Tamias striatus* (L.) (Eastern Chipmunk), *Sciurus carolinensis* Gmelin (Eastern Gray Squirrel), *Microtus pennsylvanicus* (Ord) (Meadow Vole), and *Peromyscus leucopus* (Rafinesque) (White-footed Mouse), attesting to the presence of small mammals at or near the site. No sign of woodrat feces, latrine sites, nest sites, or skeletal elements were found anywhere in the Berkshires.

Table 1. External and cranial measurements (in mm) of the single known specimen of *Neotoma magister* from Massachusetts and corresponding mean measurements of adult males from throughout the previously known range. External measurements for KU 147843 are as they appear on the specimen tag, except for length of body, which was obtained by subtracting tail length from total length, and the length of alatal bridge, which was not given. Definitions of cranial measurements follow Birney (1973) and Hayes and Richmond (1993).

Measurements	KU 147843	*Neotoma magister* Mean (sd, *n*)
Total length	365	-
Length of tail	155	-
Length of body	210	227.8 (14.3, 132)
Length of hind foot	"?"	42.7 (2.0, 133)
Length of ear	"?"	30.6 (2.3, 72)
Condylobasilar length	49.9	52.1 (2.1, 120)
Zygomatic breadth	25.9	27.1 (1.2, 128)
Least interorbital constriction	7.1	6.8 (0.2, 141)
Breadth at mastoids	19.9	20.0 (0.8, 129)
Breadth of rostrum	8.3	8.4 (0.4, 144)
Alveolar length of maxillary toothrow	9.6	9.6 (0.3, 144)
Length of alatal bridge	-	9.6 (0.7, 142)
Breadth of zygomatic plate	4.1	4.7 (0.3, 145)
Length of incisive foramen	10.8	11. 2 (0.6, 141)

During surveys of historical eyries of *Falco peregrinus* Tunstall (Peregrine Falcon) in Massachusetts that were documented by Hagar (1969), J.E. Cardoza and B.G. Blodget (former MassWildlife State Ornithologist) checked the sites for sign of peregrines, as well as for woodrats, other mammals, and selected other birds in the 1980s. One site described to J.E. Cardoza by J.A. Hagar was a series of 3 ledges southward along the ridgeline from Black Rock. When J.E. Cardoza and B.G. Blodget surveyed those sites, and additional smaller ledge areas, they found no woodrat middens or any other sign of the presence of *Neotoma*. In the early 1990s, J.E. Cardoza and D. St. James (former MassWildlife technician) searched in Mount Washington including the Bash Bish Falls area (Berkshire County) for *Meleagris gallopavo* L. (Wild Turkey) and woodrat sign along the rugged terrain and rocky cliffs and outcrops but found no sign of woodrats. All of these areas were potentially good habitat for *Neotoma* yet there was no indication of woodrat presence.

No additional woodrats or sign were found during extensive surveys throughout Massachusetts for small mammals over the past 30 y by 3 of the authors and personnel from the Massachusetts Division of Fisheries and Wildlife (MassWildlife) as part of the "Mammals of Massachusetts" project. Several reports over the years by the public of *Neotoma* from the Berkshires all turned out to be *Rattus norvegicus* (Berkenhout) (Norway Rat) upon investigation by MassWildlife staff. In addition, T.W. French and other MassWildlife staff undertook a 20-y Northern Raven project during which essentially every rock face and talus field in the state was visited nearly annually. They searched for raven pellets and food items in potential habitat of *Neotoma* at the base of rock faces and in adjacent talus. No sign of *Neotoma* was observed. Thus, the combination of the records and field efforts, and the long documented patterns of decline in other portions of the Northeast, especially New York, suggest that it is unlikely that *Neotoma magister* continues to occur in the Berkshire region or anywhere else in Massachusetts and should be considered extirpated from the state.

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